mixed in with southern ones near their northern limits is significant as it demonstrates that vegetation representing different provinces can exist under the same environmental factors.

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TWO SUBMERGED SPECIES OF UROMYCES

By Frank D. Kern

About twenty-five years ago Professor F. L. Scribner, of the U. S. Department of Agriculture, sent samples of several grasses infested with forms of Ustilaginales and Uredinales to Messrs. Ellis and Everhart for study. Among these was a rust on the leaves of *Aristida* from New Mexico which they were unable to refer to any published species and which they therefore described as a new species, *Uromyces Aristidae* Ellis & Ev.* There is throughout the United States east of the Rocky mountains a rather well-known *Uromyces* on species of *Aristida* which has, since the publication of the name by Ellis and Everhart, naturally passed as *U. Aristidae.*

Recently the writer had opportunity to examine the type specimen of *Uromyces Aristidae* Ellis & Ev. which is in the Ellis collection at the New York Botanical Garden and was much surprised to find that it is not at all like the ordinary form which has received that name in most mycological collections. Only uredinia can be found on the type specimen but they are so essentially different from the uredinia of the common *Uromyces*, especially in the presence of paraphyses and in the surface markings of the urediniospores, that there can be no possibility of their belonging to the same species. Since there are no telia on the type specimen it is not even certain that it is a *Uromyces;* it might as well be a *Puccinia* so far as any character present would indicate. Ellis and Everhart doubtless mistook the urediniospores for the teliospores of a *Uromyces*, an error not infrequently made by the earlier mycologists.

Strangely enough among all the specimens of rust on *Aristida* not a one, belonging either to *Uromyces* or *Puccinia*, has been

* Jour. Myc. 3: 56. 1887.

found which has uredinia agreeing with the type specimen of *Uromyces Aristidae* Ellis & Ev. There is an unnamed *Puccinia* from central Mexico which is like it in possessing paraphyses but which has the characters both of the paraphyses and urediniospores so different that there is scarcely a possibility of their identity. It is, therefore, impossible to dispose of the *Uromyces Aristidae* Ellis & Ev., of which there is known but the one specimen consisting of uredinia only, in any definite way without additional material and further study. It is certain, however, that the name *U. Aristidae* Ellis & Ev. can no longer, in the face of the foregoing facts, be applied to the real *Uromyces* on *Aristida*. Through the work of Arthur* this *Uromyces*-form has been culturally connected with an *Aecidium* on various species of *Plantago*. According to the practice followed by some mycologists the specific name of the aecial stage may become the name of the species provided the telial form has never received a name. In this instance, however, no such procedure is possible there being no available aecial name. The American aecia on *Plantago* have passed under the name *Aecidium Plantaginis* Ces. but they are distinct from that form. It is, therefore, necessary to supply a name for the *Aristida-Plantago* species which may be described as follows:

Uromyces seditiosus sp. nov.—O. Pycnia amphigenous, gregarious, inconspicuous, honey-yellow becoming brownish, subglobose, 80–100μ in diameter by 100–112μ high.

I. Aecia amphigenous, gregarious, cupulate or short-cylindric, 0.2–0.3 mm. in diameter; peridium colorless, margin erose, erect or somewhat recurved; peridial cells rhombic in longitudinal section, 28–35μ long, the outer wall thick, 10–13μ, transversely striate, the inner wall thinner, 4–5μ, verrucose; aeciospores subglobose or broadly ellipsoid, 14–18 × 16–22μ, the wall colorless, rather thin, 1.5μ, finely verrucose.

II. Uredinia epiphyllous, scattered, linear or oblong, cinnamon-brown, naked; urediniospores globoid, 19–26μ in diameter, the wall cinnamon-brown, moderately thick, 2–2.5μ, minutely verrucose, appearing almost smooth when wet; pores rather indistinct, 4, equatorial.

III. Telia epiphyllous, scattered or sometimes crowded and

* Bot. Gaz. 35: 17–18. 1903.

irregularly confluent, oblong, or linear 0.2–0.4 mm. wide by 0.5–1 mm. or more long, early naked, compact, pulvinate, dark chocolate-brown; teliospores broadly ellipsoid, or obovoid to nearly globoid, 15–21 × 23–39μ, rounded or obtuse at both ends, the wall chestnut-brown, usually with a slightly paler umbo, about 1.5–2μ thick, much thicker at apex, 5–10μ; pedicel tinted, rather stout, once to twice length of spore.

O and I on PLANTAGINACEAE: *Plantago aristata* Michx., Missouri (*Galloway*), Texas (*Long*); *P. eriopoda* Torrey, Montana (*Kelsey*), Wyoming (*Nelson*); *P. Purshii* R. & S., Nebraska (*Bates*), Texas (*Long*); *P. Rugelii* Dcne., Missouri (*Galloway*); *P. Tweedyi* A. Gray, Montana (*Jones*), Wyoming (*True*); *P. virginiana* L., Illinois (*Seymour*), Missouri (*Galloway*), South Carolina (*Ravenel*).

II and III on POACEAE: *Aristida basiramea* Engelm., Kansas (*Carleton*), Nebraska (*Bates*); *A. dichotoma* Michx., Arkansas (*Bartholomew*), Kansas (*Norton & Thompson*); *A. oligantha* Michx., Kansas (*Bartholomew*), Texas (*Long*); *A. purpurascens* Poir., Alabama (*Stone*), Kentucky (*Short*), New Jersey (*Ellis*).

Type collected at Wakeeney, Kansas, on *Aristida oligantha*, Sept. 15, 1906, *E. Bartholomew* (Barth. Fungi Columb. *2390*).

The uredinia of the *Uromyces Aristidae* Ellis & Ev. have paraphyses intermixed with urediniospores, the urediniospores are ellipsoid, 23–26 by 27–30μ, the wall is 2.5–3μ thick, finely and bluntly echinulate, and has 5–7 scattered pores.

Spartina is one of the most interesting genera of grasses from the mycologist's point of view on account of the unusually large number of species of rust which inhabit it. At least three species of *Puccinia* and two species of *Uromyces* have been described on it.* The validity of the three species of *Puccinia* is unquestionable but this can not be said of the *Uromyces*-forms. It is debatable whether *U. acuminatus* Arth. and *U. Spartinae* Farl. should be regarded as two species or whether they represent races of a single, somewhat variable, species. The results of cultures† might perhaps be interpreted as grounds for keeping the two forms separate but morphologically they intergrade in such a way as to throw doubt on that disposition. Without attempting

* For an account of the species inhabiting *Spartina* see Bot. Gaz. 34: 1–20. 1902.

† See Mycologia 2: 221–222, 229. 1909.

to settle that point the writer wishes now to call attention to a *Uromyces* which is undoubtedly distinct from either *U. acuminatus* or *U. Spartinae*. Its distinctive characters are the brownish or purplish spots which are produced about the sori and the few equatorial pores of the urediniospores. Neither *U. acuminatus* nor *U. Spartinae* produces such spots and both have numerous scattered pores. The new form comes from southern Florida and may be characterized thus:

Uromyces argutus sp. nov.—O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, on rather large brownish or purplish spots, linear, 1–4 mm. long, rather tardily naked, slightly pulverulent, cinnamon-brown; urediniospores broadly ellipsoid, 19–23 × 25–32μ, the wall rather thick, 2–3μ, light cinnamon-brown, finely echinulate; pores 3, occasionally 4, approximately equatorial.

III. Telia amphigenous, scattered, sometimes on discolored spots like the uredinia, linear, 1–2 mm. long, rather tardily naked, pulvinate, blackish; teliospores ellipsoid or obovoid, 16–19 × 24–32μ, usually narrowed both above and below, the wall dark chestnut-brown, 1.5–2μ thick, much thickened at apex, 7–10μ, smooth; pedicel tinted, about twice length of spore.

Type collected at Miami, Florida, on *Spartina glabra* Muhl., March 25, 1903, *E. W. D. Holway*.

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REVIEWS

Duggar's Plant Physiology*

Professor Duggar's "Plant Physiology" occupies a zone of tension between pure and applied science, and it is not easy to do the book entire justice in a review, owing in part to the fact that it is quite unlike anything else we have, and the reviewer has continually to adjust his orientation. It seems to the writer that the book would be less liable to misinterpretation if the title by which it was announced in advance, "The Physiology of Plant Production," had been retained on the title-page. As

* Duggar, Benjamin M. Plant Physiology, With special reference to plant production. Pp. i–xv+1–516, frontispiece and figs. 1–144. New York. The Macmillan Co. 1911. Price $1.60.